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Pesticide Fact Sheet Number 95
1,3-Dichloropropene

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This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors
Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

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Washington, DC 20460

EPA

Pesticide Fact Sheet

Name of Chemical: 1,3-Dichloropropene
Reason for Issuance: Registration Standard
Date Issued: September 1986
Fact Sheet Number: 95

1. Description of the chemical

Generic name: 1,3-dichloropropene ($C_3H_4Cl_2$)
Common name: None
Trade names: Telone II®, Dow Telone®,
Chemical Abstracts Service (CAS) Registry Number: 542-75-6
Office of Pesticides Program Number: 029001
Year of initial registration: 1966
Pesticide type: Broad spectrum soil fumigant
Chemical family: Chlorinated hydrocarbon
U.S. producer: Dow Chemical Company

2. Use patterns and formulations:

Application sites: A soil fumigant with nematicidal, fungicidal, insecticidal and herbicidal properties, for use on cotton, potatoes, tobacco, sugar beets, vegetables, grains, citrus fruit tree planting sites, deciduous fruit and nut-tree planting sites, bush and vine planting sites, floral/turf and ornamental tree sites.

Types of formulations: 94% liquid concentrate formulations.

Types and methods of applications: Chisel injection into the soil, using row (banded) or overall (broadcast) treatment.

Application rates: 43 to 968 lbs ai/acre. One application per year.

Usual carriers: None

3. Science Findings

Science summary: The Agency has categorized 1,3-dichloropropene as a probable human carcinogen. Chronic toxicity data show that the chemical is oncogenic at multiple sites in both sexes of rats and mice. Other data supporting the oncogenic finding of 1,3-dichloropropene are: (1) a subcutaneous injection study in mice which showed increased incidence of fibrosarcomas at the site of injection, (2) studies showing that the compound is a direct acting mutagen, and (3) the structural similarity between 1,3-dichloropropene and known human oncogens (i.e. vinyl chloride). The chemical has not been shown to cause teratogenic effects in rats or rabbits. 1,3-dichloropropene is acutely toxic by the oral and inhalation routes of exposure.

1,3-dichloropropene has low to moderate toxicity to birds and moderate toxicity to fish and aquatic invertebrates. Limited data indicate that 1,3-dichloropropene has the potential to leach ground water in sensitive environments. Available data are insufficient to more completely assess the environmental fate of the pesticide. Available data are also insufficient to assess the residues in raw agricultural commodities.

1,2-Dichloropropane, an impurity in 1,3-dichloropropene, is oncogenic in rats and mice. However, its oncogenic potency is lower than for 1,3-dichloropropene. Data indicate that 1,2-dichloropropane has the potential to leach to ground water.

Chemical characteristics:

Color: Pale yellow liquid at room temperature.
Molecular weight: 110.98.
Miscible in hydrocarbon solvents.

Toxicological Characteristics:

Acute oral toxicity - 470 to 713 mg/kg, Toxicity Category II

Acute oral toxicity - 640 mg/kg, Toxicity Category III,

Skin irritation - Moderate irritant, Toxicity Category III

Eye irritation - Corneal opacity reversible within seven days, Toxicity Category II.

Subchronic toxicity

Subchronic inhalation (rat and mouse) - NOEL 30 ppm

Chronic toxicity. A two-year rat oral gavage study had a NOEL of 25 mg/kg/day. Effects noted were an increased incidence of basal hyperplasia in treated males and females, increased kidney nephropathy in treated females, and urinary bladder edema at high dosages in males and females.

In a two year mouse feeding study, the effects noted were reduced female survival rate at the high dose and increased incidences of urinary bladder epithelial cell hyperplasia in both males and females in the mid-and high-dose levels. A NOEL was not determined in this study.

Oncogenicity: 1,3-dichloropropene has been classified as a probable human carcinogen based on studies in rats and mice. Oral studies in rats showed that it produced squamous cell papillomas and carcinomas of the forestomach in males at the high dose. In the liver, there were increases of neoplastic nodules in treated males at both dosage levels compared to the controls. In female rats, squamous cell papillomas of the forestomach, mammary gland adenomas/fibroadenomas and thyroid follicular cell adenomas/carcinomas were observed.

In mice, 1,3-dichloropropene produced an increased incidence of urinary bladder transitional cell carcinomas, squamous cell papillomas of the forestomach, and lung adenomas and carcinomas (combined) in females at the mid and high dosage levels. There was an increase in hepatocellular adenomas and carcinomas in the females at the mid dosage level. In male mice, there was an increased incidence of hepatocellular adenomas in combination with carcinomas, lung adenomas in combination with carcinomas, and squamous cell papillomas of the forestomach at the mid and high dosage levels. Urinary bladder carcinomas were also observed in the males at the high dosage level.

Studies also indicate that 1,2-dichloropropane, an impurity in 1,3-dichloropropene, is an oncogen in rats and mice, but the Agency believes it is a less potent oncogen than 1,3-dichoropropene.

Mutagenicity: 1,3-dichloropropene has been determined to be a direct acting mutagen. 1,3-dichloropropene has produced positive gene mutation in microbial systems. In addition, 1,3-dichloropropene produced positive results for DNA damage/repair in microbial strains. Data on structural chromosomal aberration are not available. These studies are required.

Reproductive effects: No data are available on reproductive effects. A two-generation reproduction study is required.

Developmental effects: In two inhalation studies, 1,3-dichloropropene was found to cause developmental effects in rats and rabbits. In the rat study, no teratogenic effects were observed, but maternal toxicity occurred at all dose levels. Developmental toxicity (delayed ossification of vertebral centra) occurred at the highest dose (120 ppm). In the rabbit study maternal toxicity occurred at the 2 highest dose levels (60 ppm and 120 ppm), but no evidence of developmental toxicity was apparent.

Exposure: The average inhalation exposure of applicators engaged in various work activities is estimated to range from 0.15 to 23.99 mg/kg/year.

Dietary exposure to 1,3-dichloropropene has not been estimated. Residue data for this assessment are required.

Risks to workers and applicators: The upper bound inhalation oncogenic risks to workers handling 1,3-dichloropropene during distribution and storage are estimated to be in the range of 10^{-2} to 10^{-5}. Risks to applicators during and immediately post-treatment are estimated to be in the range of 10^{-3} to 10^{-5}.

Physiological and biochemical behavioral characteristics: Mechanism of pesticidal action: 1,3-dichloropropene acts as a sterilant on contact with the pest.

Metabolism in plants: Metabolism of 1,3-dichloropropene in plants is not adequately understood.

Environmental characteristics: Data indicate that 1,2-dichloropropane, an impurity of technical 1,3-dichloropropene has the potential to leach to ground water. Additional studies on the environmental fate of 1,3-dichloropropene, its impurities and metabolites are required. Data indicate that 1,3-dichloropropene itself leaches to ground water when it is present in the most sensitive environment (shallow ground water and sandy soils of low percentage organic matter in areas of high rainfall or irrigation).

Ecological characteristics:

Avian acute oral toxicity:	Bobwhite quail - 152 mg/kg
Avian dietary toxicity:	Mallard duck - >10,000 ppm Bobwhite quail - >10,000 ppm
Aquatic invertebrate toxicity:	*Daphnia magna* - 6.2 ppm
Freshwater fish toxicity:	Bluegill sunfish - 7.09 ppm Rainbow trout - 3.94 ppm

Based on these data, the Agency characterizes 1,3-dichloropropene as low to moderately toxic to waterfowl and upland game birds. 1,3-dichloropropene is moderately toxic to coldwater fish, warmwater fish, and freshwater invertebrates.

Endangered species: 1,3-dichloropropene has low to moderate toxicity to birds and aquatic species. Available data do not indicate a potential hazard to endangered species.

Tolerance assessment: No tolerances or exemptions from the requirement of tolerances for residues of 1,3-dichloropropene in or on food/feed commodities have been established in the United States, Mexico, Canada or by the Codex Alimentarius.

Current data are inadequate to determine if residues of 1,3-dichloropropene, its metabolites, or manufacturing impurities will result in food or feed from use of 1,3-dichloropropene. Data on the metabolism of 1,3-dichloropropene in crops grown in treated soils are required. The additional data will be used to assess possible residues in food and feed crops and may lead to additional data requirements in residue chemistry. Tolerances in food crops may be necessary if residues are found in crops, and may be necessary in animals if residues are found in animal feed items.

Reported pesticide incidents: The Agency's Pesticide Incidence Monitoring System does not report any incidents during the period 1966-1981. However, information from the State of California indicates that physicians treated an average of 2.20 1,3-dichloropropene incidents annually from 1981 through 1985. An additional 3.80 occupational cases were reported annually as dermal (1.80) or eye (2.00) injuries.

4. Summary of regulatory positions and rationale:

--- The Agency has placed 1,3-dichloropropene in Special Review because of oncogenic effects. 1,3-dichloropropene has been categorized as a probable human carcinogen, with effects demonstrated at multiple sites in both sexes of rats and mice.

--- The Agency is classifying the 1,3-dichloropropene products for Restricted Use by certified applicators only, based upon acute toxicity and oncogenicity. Restricted use will help ensure that mixer/loaders and applicators observe use precautions intended to protect against inhalation exposure.

--- The Agency is continuing on an interim basis the current reentry interval of 72 hours for 1,3-dichloropropene products.

--- The Agency is continuing to require protective clothing and equipment during mixing, loading, application, and if spillage occurs. Protective clothing and equipment include coveralls, gloves, heavy-duty footwear, safety goggles, and a mask or respirator approved for use with 1,3-dichloropropene.

--- Available residue data are inadequate to determine if residues of 1,3-dichloropropene, its metabolites, or manufacturing impurities will occur in food or feed as a result of soil fumigation. Although such fumigation use has in the past been considered non-food, the Agency may require the establishment of tolerances in food, feed, or animals if residues are found.

--- The Agency is requiring environmental fate data including ground water monitoring studies on 1,3-dichloropropene, its impurities, and metabolites to determine whether there is a potential for groundwater contamination.

--- The Agency will require a cancer hazard warning statement on 1,3-dichloropropene products, to provide the opportunity for informed consent by users, and to encourage compliance with protective measures that will reduce exposure.

--- Endangered species labeling statements are not warranted at this time, based upon available data. If environmental fate or other data indicate a potential hazard to endangered species, the Agency will request a consultation from the Office of Endangered Species, Department of the Interior.

5. Labeling Statements.

a. Manufacturing-Use Products

Precautionary Statements: "DANGER. Causes severe eye damage. May be fatal if inhaled, absorbed through skin, or swallowed. Do not get in eyes, on skin or on clothing. Wear chemical worker goggles, face shield or safety glasses. Wash thoroughly with soap and water after handling, and before eating and smoking".

Effluent discharge statement: "Do not discharge effluent containing this product directly into lakes, streams, ponds, estuaries, oceans or public waters unless this product is specifically identified and addressed in a National Pollutant Discharge Elimination System (NPDES) permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the Environmental Protection Agency".

Cancer Hazard Warning Statement: " The use of this product may be hazardous to your health. This product contains 1,3-dichloropropene which has been determined to cause tumors in laboratory animals. Risks can be reduced by closely following the use directions and precautions, and by wearing protective clothing specified elsewhere on this label".

b. End Use Products.

Precautionary statements: "DANGER. Causes severe eye damage. May be fatal if inhaled, absorbed through skin, or swallowed. Do not get in eyes, on skin or on clothing. Wear chemical worker goggles, face shield or safety glasses. Wash thoroughly with soap and water after handling, and before eating and smoking."

Restricted use statement: "For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification."

Cancer Hazard Warning Statement: " The use of this product may be hazardous to your health. This product contains 1,3-dichloropropene which has been determined to cause tumors in laboratory animals. Risks can be reduced by closely following the use directions and precautions, and by wearing protective clothing and equipment specified elsewhere on this label."

Enviromental hazard statement: "Do not contaminate water by cleaning of equipment or disposal of wastes. In case of spills, properly dispose of contaminated materials."

Protective clothing statements: "Required clothing and equipment for mixing/loading and applying 1,3-dichloropropene":

"One-piece coveralls which have long sleeves and long pants constructed of laminated fabric as specified in the USDA/EPA Guide for Commercial Applicators".

"Liquid-proof hat such as a plastic hard hat with a plastic sweat band".

"Heavy-duty liquid proof (neoprene/synthetic) work gloves and boots".

"Any article worn while handling 1,3-dichloropropene must be washed before reusing. Immediately remove all clothing which has been drenched or has otherwise absorbed 1,3-dichloropropene from any spill. Dispose of contaminated clothing in a sanitary landfill, or by incineration if allowed by state and local authorities. If burned, stay out of smoke."

Reentry statement: "Workers entering the treated area for 72 hours after application of 1,3-dichloropropene must wear protective clothing."

Storage And Disposal Statements: "Pesticide wastes are hazardous. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for Guidance."

5. Summary of major data gaps:

Residue chemistry data	
Nature of residue (plant metabolism)	May 30, 1987
Storage stability	May 30, 1987
Crop field Trials	April 30, 1988.
Toxicology data	
Acute dermal toxicity	June 30, 1987
Acute inhalation toxicity	June 30, 1987
Dermal sensitization	June 30, 1987

21 day dermal	October 30, 1987
Chronic toxicity - dog	December 30, 1990
Oncogenicity - rat and mouse	July 30, 1988
Reproduction	July 30 1987
Structural chromosomal aberration	October 30, 1987
General metabolism	October 30, 1988
Environmental fate data	
Photodegradation in air	June 30, 1987
Aerobic soil metabolism	January 30, 1989
Anaerobic aquatic metabolism	January 30, 1989
Aerobic aquatic metabolism	Janaury 30, 1989
Mobility of degradates (leaching, adsorption/desorption)	October 30, 1987
Soil dissipation	January 30, 1989
Aquatic sediment	January 30, 1989
Soil dissipation (long-term)	December 30, 1990
Accumulation in rotational crops (confined)	January 30, 1990
Monitoring ground water & well water (protocol)	April 30, 1988.
Reentry protection data	
Soil dissipation	January 30, 1989
Dermal exposure	January 30, 1989
Inhalation exposure	January 30, 1989

Ecological effects data are not required for this Standard.

Product chemistry data are required during 1987.

6. Contact Person at EPA:

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